It is an object of this invention to propose a new X-ray tube and a corresponding method of production of such an X-ray tube not having the drawbacks described above. In particular, an X-ray device should be proposed allowing electric powers several times higher than conventional X-ray devices. The tubes should also be able to be constructed modularly, and be produced simply and economically. Furthermore any possible defective parts of the X-ray tube should be replaceable without the whole X-ray tube having to be replaced.

This object is achieved according to the present invention in particular through the elements of the independent claims. Further advantageous embodiments follow moreover from the dependent claims and from the specification.

These objects are achieved in particular through the invention in that an anode and a cathode are disposed opposite each other in a vacuumized inner space in an X-ray tube, electrons being produced at the cathode, being accelerated to the anode by means of impressible high voltage, and X rays being produced at the anode by means of the electrons, the X-ray tube comprising a multiplicity of mutually complementary acceleration modules, which acceleration modules each comprise at least one potential-carrying electrode, the first acceleration module comprising the cathode with primary electron generation, and the last acceleration module comprising the anode with the X-ray generation, and the X-ray tube comprising at least one further acceleration module with a potential-carrying electrode, which acceleration module is connectible in series in a repeatable way as often as desired for acceleration of electrons, and the X-ray tube being of modular construction. The anode can comprise a target for X-ray generation with an emission hole, or can be designed as a transmission anode, in the case of the transmission anode the vacuumized inner space of the X-ray tube being closed off toward the outside. At least one of the electrodes can comprise spherical or conical ends for reducing or minimizing the field peak at the respective electrode. The electrodes can be connected, for example, with a high voltage cascade, e.g. by

means of voltage connections. One advantage, among others, of the invention is that very high power X-radiation can be generated, the overall geometric size of the X-ray tube being small, in particular compared with tubes of the state of the art, and at the same time the invention makes possible an X-ray tube which is able to be operated in a stable manner over a very broad electrical voltage range without performance characteristics changing. A further advantage of the invention, among others, is a by far more minimal stress on the insulator from the *E*- field. This applies in particular when compared with the conventional discoidal insulators. The X-ray tube according to the invention can be produced e.g. in a one-shot method, the soldering of the entire tube taking place in a one-step vacuum soldering process. This has in particular the advantage that the subsequent evacuation of the X-ray tube by means of high vacuum pump can be omitted. It is a further advantage that the X-ray tube according to the invention, owing to its simple and modular construction, is especially well suited to the one-shot method since the fields inside the tube are much smaller than in the case of conventional tubes, and the tube according to the invention is thereby less vulnerable to impurities and/or leaks.

In an embodiment variant, the difference in potential between two potential-carrying electrodes each of adjacent acceleration modules is selected to be constant for all acceleration modules, the final energy of the accelerated electrons (e^-) being a whole-number multiple of the energy of an acceleration module. This embodiment variant has the advantage, among others, that the stress on the insulators is constant over the path, and no field peaks occur that could have a disadvantageous effect upon the operating ability of the tube.

In another embodiment variant, at least one of the acceleration modules has a reclosable vacuum valve. The acceleration modules can thereby be provided with a a <sic.> vacuum seal on one side or on both sides in order to permit an air-tight closure between the individual acceleration modules. This embodiment variant has the advantage, among others, that by means of

the vacuum valve individual parts of the X-ray tube can be replaced without the entire tube having to be replaced, as in the case of conventional X-ray tubes. Since the tube is of modular construction, the tube is able to be subsequently adapted to changed operational requirements without any difficulty by further acceleration modules being inserted or existing modules removed. This is not possible in this way with any of the tubes of the state of the art.

In a further embodiment variant, the acceleration modules contain a cylindrical ceramic insulator. This embodiment variant has the advantage,